

## REMARKS

Claims 1-4 are currently pending in the above-identified patent application. In the subject Office Action dated October 28, 2002, the Examiner rejected claims 1 and 3 under 35 U.S.C. 102(e) as being anticipated by Varaprasad et al. (U.S. Patent No. 6,245,262), since the Examiner asserted that Varaprasad et al. shows an actuator consisting of a conjugated polymeric material **6**, whereby said material expands when an electrical voltage is applied between two locations thereof (between electrodes **4** and contracts when the electrical voltage is reduced. The Examiner continued by stating that the conjugated polymeric material Varaprasad et al. comprises polyaniline.

Claims 1 and 3 were next rejected under 35 U.S.C. 102(b) as being anticipated by Jang (U.S. Patent No. 5,869,007), since the Examiner stated that Jang notes an actuator consisting of a conjugated polymeric material (Col. 3, II 10-19), whereby said material expands when an electrical voltage is applied between two locations thereof (between electrodes) and contracts when the electrical voltage is reduced. The Examiner continued by stating that the conjugated polymeric material comprises polyaniline.

Claims 1 and 3 were next rejected under 35 U.S.C. 102(b) as being anticipated by Takahashi et al. (U.S. Patent No. 5,177,330), since the Examiner asserted that Takahashi et al. shows (Fig. 2b) an actuator consisting of a polymeric material, whereby said material expands when an electrical voltage is applied between two locations thereof (between **11** and **14**), and contracts when the electrical voltage is reduced. The Examiner continued by stating that said conjugated polymeric material comprises polyaniline (teaching of an equivalence of materials at Col. 4, II 53-59).

Claims 1 and 3 were also rejected under 35 U.S.C. 102(b) as being anticipated by Brotz (U.S. Patent No. 6,161,382), since the Examiner states that Brotz in Fig. 4 shows an actuator consisting of a conjugated polymeric material **(20)**, whereby said material expands when an electrical voltage is applied between two locations thereof (between electrodes **18** and **22**) and contracts

when the electrical voltage is reduced. The Examiner continued by stating that said conjugated polymeric material is polyaniline (Col. 4, ll11-13).

Lastly, claims 2 and 4 were rejected under 35 U.S.C. 103(a) as being unpatentable over any of Varaprasad et al., Jang, Takahashi et al. or Brotz, since the Examiner asserted that given any of these inventions, although none explicitly notes doping of the polyaniline, applicants note in their remarks that such is common in the art. The Examiner then concluded that to employ the commonly used doped polyaniline in any of these inventions would have been obvious to one having ordinary skill in the art.

Applicants respectfully disagree with the Examiner regarding these reasons for rejecting claims 1-4, for the reasons to be set forth hereinbelow. Reexamination and reconsideration are respectfully requested.

Briefly, the present invention includes a method of actuation and a conjugated polymer actuator device which expands when an electrical voltage is applied between two locations on the same piece of polymeric material, and contracts when the electrical voltage is reduced or removed, in the absence of liquids, vapors or metal backing for adding or removing ions from the material. That is, a voltage (or potential difference) is applied between two positions on the same piece of polymer material.

Applicants wish to begin by pointing out that in accordance with the Merriam-Webster Unabridged Dictionary, "actuator" is defined as: "a mechanical device for moving or controlling something". Additionally, applicants have used the language "consisting" in claims 1 and 3 in order to particularly point out that the voltage is applied between two locations on one piece of polymeric material.

Turning now to the rejection of claims 1 and 3, under 35 U.S.C. 102(e) as being anticipated by Varaprasad et al. (U.S. Patent No. 6,245,262), applicants wish to direct the Examiner's attention to Col. 36, ll 4-54 and, in particular, to lines 13-17 and lines 38-41, where it is stated that "A source of an applied potential need be introduced to the electrochromic assembly 1 so that polychromic solid film 6 may color in a rapid, intense and uniform manner. That source may be connected by electrical leads 8 to conducting strips, such as bus

bars 7. ... The conductive coating 4 should also be highly and uniformly conductive in each direction to provide a substantially uniform response as to film coloring once a potential is applied." Applicants fail to understand how Varaprasad et al. teaches the mechanical actuation claimed in claims 1 and 3 of the present invention. By contrast, Varaprasad et al. teaches the electrical excitation of an electrochromic assembly. Moreover, solid film 8 of Varaprasad et al. is not stimulated at two points as is taught by subject claims 1 and 3; rather, a uniform electrical excitation is applied. Therefore, applicants respectfully believe that the Examiner has incorrectly used Varaprasad et al. as a reference under 35 U.S.C. 102(e).

Claims 1 and 3 were further rejected under 35 U.S.C. 102(b) as being anticipated by Jang (U.S. Patent No. 5,869,007). Applicants fail to understand how Jang teaches the mechanical actuation claimed in claims 1 and 3 of the present invention. By contrast, Jang teaches an acid/base measuring sensor based on chemical/electrical response characteristics of poly(aromatic amines) such as polyaniline. Protonation (doping) and deprotonation (de-doping) of the –N= sites in the polymers permits conductivity versus concentration calibrations to be generated from which acid/base concentrations can be determined for unknown samples. Therefore, applicants respectfully believe that the Examiner has incorrectly used Jang as a reference under 35 U.S.C. 102(b).

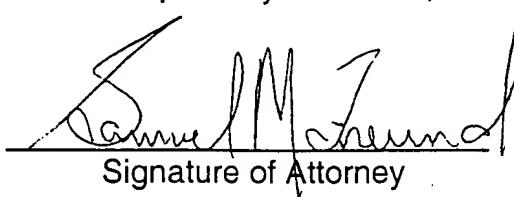
Claims 1 and 3 were next rejected under 35 U.S.C. 102(b) as being anticipated by Takahashi et al. (U.S. Patent No. 5,177,330). Applicants fail to understand how Takahashi et al. teaches the mechanical actuation claimed in claims 1 and 3 of the present invention. By contrast, Takahashi et al. teaches a membrane switch comprising a thin-film diode having a p-n junction formed from two polymer films. See, for example, Col. 3, lines 22-37 of Takahashi et al. Again, the polymer film is not contacted at only two locations by the associated electrodes as is taught by subject claims 1 and 3; rather, a uniform excitation across the surface of the electrode is applied to the thin films. Therefore, applicants respectfully believe that the Examiner has incorrectly used Takahashi et al. as a reference under 35 U.S.C. 102(b).

Claims 1 and 3 were also rejected under 35 U.S.C. 102(b) as being anticipated by Brotz (U.S. Patent No. 6,161,382). Brotz teaches a three-layered semiconductor strip in the form of a thermocouple which is capable of controlled expansion and contraction when an electrical current is applied thereto. In Col. 3, lines 63-67 through Col. 4, lines 1-13, of Brotz, it is stated that electrical wires are connected to the outside layers of the three-layered strip. Therefore, it is clear from Fig. 4 of Brotz that the intervening film is in electrical contact with the entire surfaces of the sandwiching electrode layers, rather than at only two locations as is taught by subject claims 1 and 3. Therefore, applicants respectfully believe that the Examiner has incorrectly used Brotz as a reference under 35 U.S.C. 102(b).

Claims 2 and 4 were rejected under 35 U.S.C. 103(a) as being unpatentable over any of Varaprasad et al., Jang, Takahashi et al. or Brotz. Applicants believe that the Examiner has incorrectly used Varaprasad et al., Jang, Takahashi et al., and Brotz as references under 35 U.S.C. 102. Applicants believe further that combinations of these references do not teach the recitations of claims 2 and 4. Additionally, since claims 2 and 4 depend from claims 1 and 3 hereof, respectively, following the discussion set forth hereinabove, none of these references either alone or in combination, when further combined with the Examiner's assertion that applicants have noted that doping is common in the art, teach the recitations of claims 2 and 4.

For the reasons set forth hereinabove, applicants believe that claims 1-4 are in condition for allowance and such action by the Examiner at an early date is earnestly solicited. Reexamination and reconsideration are respectfully requested.

Respectfully submitted,



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